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Morganella austromontana sp. nov. from the South Brazilian Plateau

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Abstract—A new *Morganella* species was collected during field exploration of the mycobiota of the South Brazilian Plateau. It is proposed here as *Morganella austromontana*, distinguished by its ovoid basidiospores and its soil habitat. A complete description and illustrations of its morphological features are accompanied by a taxonomic discussion.

Key words—*Agaricaceae*, *Agaricomycetidae*, *Araucaria angustifolia* forest, puffballs, taxonomy

Introduction

Morganella Zeller is diagnosed by small gasteroid basidiomata (puffballs) that are globose, subglobose or depressed enclosed within a double peridium comprising a granular, verrucose, velutinous or spiny exoperidium and an endoperidium with an apical pore; basidiospores are globose or subglobose (rarely ovoid), a eucapillitium is absent, and a paracapillitium is present (Zeller 1948, Kreisel & Dring 1967). About 20 species have been included in the genus. From Brazil, 12 species have been reported and/or described in the last decade (Cortez et al. 2007; Trierveiler-Pereira & Baseia 2009; Barbosa et al. 2011; Alfredo et al. 2012, 2014; Alfredo & Baseia 2014; Alves & Cortez 2013). These puffballs occur in diverse Brazilian biome habitats, including arid environments (Barbosa et al. 2011) and seasonal ombrophilous forests (Alfredo et al. 2012, Alves & Cortez 2013) where they grow on rotting wood among litter and mosses.

During a survey of the gasteroid mycobiota in South Brazilian forests in the Atlantic Forest biome, a new *Morganella* species was found growing in the mixed ombrophilous forest typical of south Brazil. Here we describe this species as *Morganella austromontana*.

Materials & methods

Specimens were gathered during field trips in the natural reserves of the Rio das Furnas in the municipality of Alfredo Wagner (27°42′00″S 49°20′02″W), State of Santa Catarina, and the National Park of Aparados da Serra in the municipality of Cambará do Sul (29°08′02″S 49°59′40″W), State of Rio Grande do Sul. Both sites are covered by *Araucaria angustifolia* forests and are located on the South Brazilian Plateau at altitudes of 900–1200 m (Veloso et al. 1991). Köppen (1948) classified the region's climate as Cfb: mesothermic, wet (with regular rainfall throughout the year), and with mild summers.

The specimens were examined morphologically according to Miller & Miller (1988). Colors were coded according to the color chart of Kornerup & Wanscher (1978). Measurements and photographs were taken using a Motic BA310 microscope equipped with a Moticam 2500 digital camera and Motic Image Plus 2.0 software. Scanning electron microscopy (SEM) was performed at the Center of Electronic Microscopy of the Universidade Federal do Rio Grande do Sul (CME/UFRGS) under a Jeol JSM-6060 SEM. All studied specimens are preserved at the Herbarium, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil (ICN). Five collections from Rio Grande do Sul conserved in the ICN Herbarium representing species closest to *M. austromontana* were also examined.

Taxonomy

Morganella austromontana C.R. Alves, Cortez & R.M. Silveira, **sp. nov.** Figs 1–6

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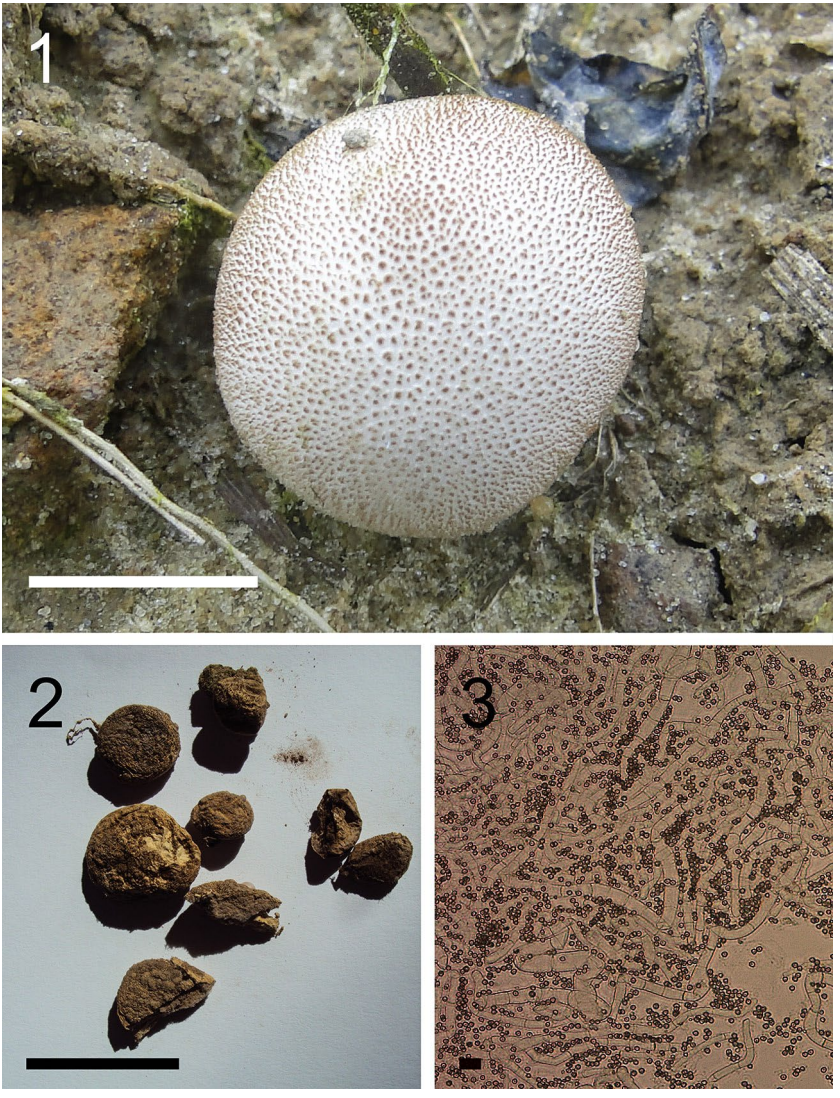
Differs from *Morganella subincarnata* by its lighter exoperidium, its ovoid basidiospores, and its habitat on soil in araucariaceous forest.

Type—Brazil, Santa Catarina State: Alfredo Wagner, Reserva do Rio das Furnas, 7.I.2014, leg. C.R. Alves 94 (**Holotype**, ICN 181431).

Etymology—The name, meaning "from the southern mountains," refers to the montane type region on the South Brazilian Plateau.

Basidiomes 10 mm high, 8–20 mm diam., subglobose to pyriform. Exoperidium spiny, formed of short spines (<1 mm high), numerous and densely grouped on the top of the basidioma, light brown (6D5) when fresh, falling away as plates detach from the endoperidium when mature. Endoperidium papery, smooth to areolate, white (1A1) when fresh, then yellow grey (2B2) after dried. Sterile Base poorly developed to present, reaching 3 mm high, yellowish grey (2B2), with scattered, white and thin rhizomorphs (<1 mm thickness).



Figs 1–3. *Morganella austromontana* (holotype ICN 181431). 1. Basidiome in situ. 2. Dried basidiomata. 3. Paracapillitium and basidiospores. Scale bars: 1, 2 = 10 mm; 3 = 10 µm.

Gleba cottony, brownish grey (2D2). Subgleba present, ≤3 mm high, cellular, greyish yellow (1B3). Basidiospores 4–5 × 3–4 µm, ovoid to subglobose, pale green in 5% KOH, surface verrucose under light microscope, spiny under SEM;

spines cone-shaped, <2 µm high. Paracapillitium 7–10 µm diam., inflated, with numerous small pores c. 1 µm diam., amorphous matter surrounding the hyphae, septa regular, sometimes, with dichotomous tips. Exoperidium hyphae 10–26 × 8–15 µm diam., globose, subglobose or pyriform, hyaline to pale yellow, walls thin, about 1 µm. Mycosclereids 25–80 × 7–13 µm diam., irregular in shape, hyaline, walls thick (3 µm) and smooth.

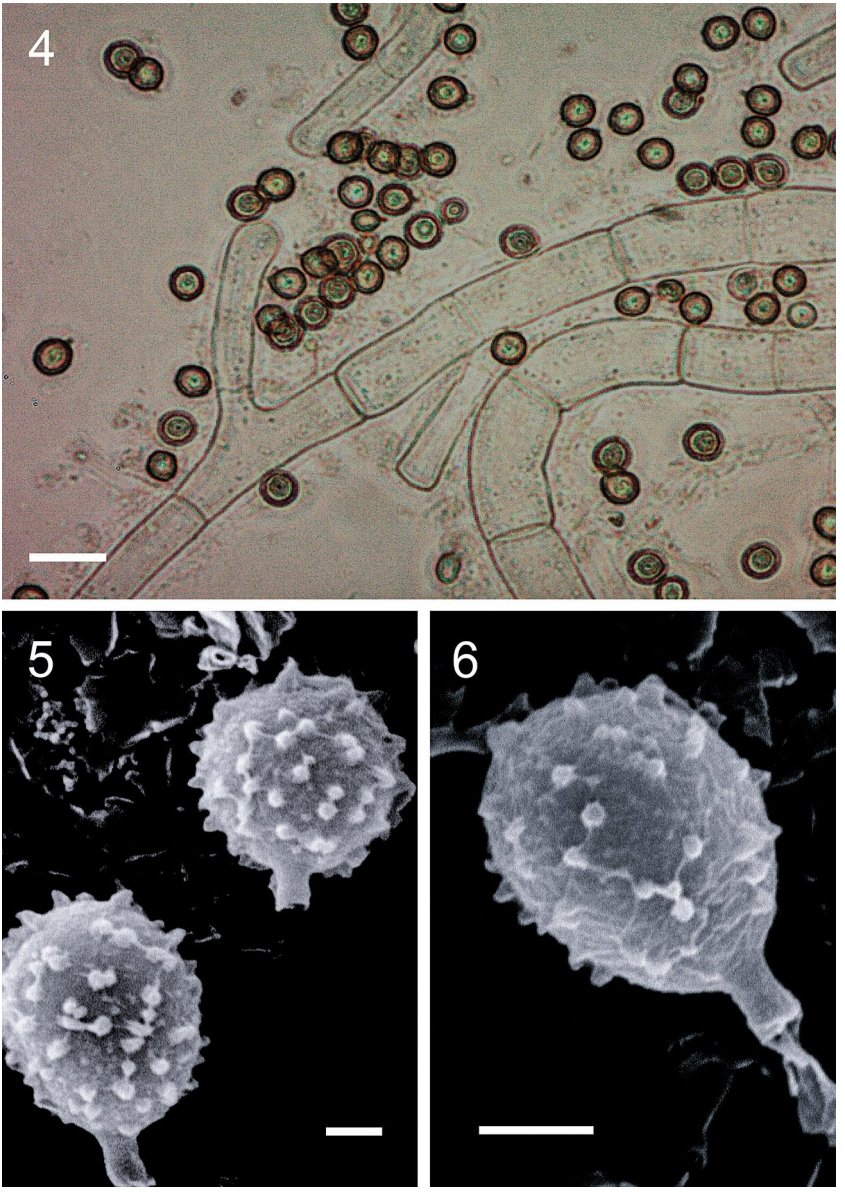
Ecology & distribution—Basidiomata solitary to gregarious, growing on soil, among a few herbs on the trail board in the Mixed Ombrophilous Forest, with *Araucaria angustifolia* (Bertol.) Kuntze (*Araucariaceae*; Paraná pine, Brazilian pine), about 480–900 m altitude, during rainy summer. Only known from the South Brazilian Plateau (States of Rio Grande do Sul and Santa Catarina).

Additional specimens examined — **BRAZIL. Rio Grande do Sul State: Cambará do Sul, Parque Nacional dos Aparados da Serra,** 13.III.2014, leg. A. Gerlach 1486 (ICN 181432); **São Francisco de Paula,** Veraneio Hampel, 8.I.2006, leg. V.G. Cortez 013/06 (ICN 154553); FLONA, 21.IV.2007, leg. V.G. Cortez 048/07 (ICN 154554); **Itaara,** Parque Pinhal, 4.V.2007, leg. V.G. Cortez 075/07 (ICN 154555); **Santa Maria**, FEPAGRO, 15.V.2007, leg. V.G. Cortez s.n (ICN 154556); Campus UFSM, 4.VI.2007, leg. G. Coelho 485-7 (ICN 154557).

Comments—*Morganella austromontana* is described as a new based on its combination of mainly ovoid ornamented basidiospores (verrucose under LM; shortly spiny under SEM) and an exoperidium densely covered with short white spines in younger basidiomata that become pale brownish and fall as plates in maturity. Another diagnostic feature is the relatively wide (≤10 µm) diameter of paracapillitium hyphae, which is rarely greater than 5–6 µm in other species. The thick-walled mycosclereids found in the exoperidium of *M. austromontana* have also been observed in *M. sulcatostoma* C.R. Alves & Cortez (Alves & Cortez 2013).

Morganella austromontana can be nested among members of *Morganella* sect. *Subincarnata* sensu Ponce de Leon (1971), a section that accommodates species with a deciduous exoperidium and reticulate-areolate endoperidium. Within *M.* sect. *Subincarnata*, *M. costaricensis* M.I. Morales, which shares with *M. austromontana* an exoperidium with deciduous spines and areolate endoperidium, can be separated by its smooth globose to subglobose basidiospores (Morales et al. 1974, Suárez & Wright 1996).

The type species of the section, *Morganella subincarnata* (Peck) Kreisel & Dring, appears related to *M. austromontana* based on its similar pattern of exo- and endoperidium but differs in its darker (olivaceous brown) exoperidium, its globose basidiospores (3.5 × 6.5 µm diam.), and its preferred substrate on



Figs 4–6. *Morganella austromontana* (holotype ICN 181431). 4. Basidiospores and paracapillitium. 5, 6. Basidiospores (SEM). Scale bars 4 = 10 µm; 5, 6 = 1 µm.

angiospermous wood (Bowerman 1961, as *Lycoperdon subincarnatum*; Coker & Couch 1928, as *Lycoperdon subincarnatum*; Kreisel & Dring 1967; Ponce de Leon 1971).

Another noteworthy feature of *Morganella austromontana* is the fact its basidiomata were collected from soil, instead of rotting wood, the usual substrate for most *Morganella* species. However, a soil substrate is not exclusive to *M. austromontana;* for example, *M. arenicola* Alfredo & Baseia grows on sandy soil (Alfredo et al. 2014).

Further fieldwork will be necessary to determine if the proposed species is, in fact, restricted to the southern Brazilian highlands and, in particular, to *A. angustifolia* forests. However, based on the current available data and ongoing survey of the gasteroid fungi of Southern Brazil, *M. austromontana* appears strongly associated with these environments.

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